(Table 4.2-2). Many of these quantifiable concentrations exceeded the objectives of the California Ocean Plan but were unrelated to effluent discharge. Of the variety of sources that could be responsible for input of metals into coastal waters, municipal and industrial discharges, onshore runoff, vessel coatings, and atmospheric fallout contribute the greatest volumes (Eganhouse and Venkatesan 1993).

It is unlikely that the Refinery's discharge contributed materially to the observed dissolved metal concentrations because their spatial distribution was unrelated to discharge proximity and the Refinery's effluent concentrations were comparatively small, especially considering that the effluent is diluted 80-fold shortly after discharge (Chevron 2007d). In contrast to seawater samples collected at other stations, the sample from Station RW16, which is proximal to the Marine Terminal berths, contained a detectable concentration of mercury alone. Organic contaminants are not regularly detected in seawater samples collected near the Marine Terminal.

Table 4.2-2
Trace-Metal Concentrations Measured in Seawater Samples Collected Near the Marine Terminal

Station	Arsenic	Copper	Lead	Mercury	Zinc
S1			0.023		
S3	0.031	0.15	0.020		
RW1	0.11				
RW3	0.087				
RW7	0.12				
RW8	0.042				
RW9			0.023		
RW10	0.1		0.026		
RW14			0.024		
RW15			0.025		
RW16				0.00045	
RW17		0.055	0.029		
RW18			0.021		0.11
Ocean Plan	0.08	0.03	0.02	0.0004	0.20
Refinery Effluent	0.036	0.023	<0.012	Non-Detect	0.221

Note: Figure 4.2-6 shows station locations. The instantaneous-maximum limiting concentrations from the California Ocean Plan are shown for comparison. All concentrations are reported in milligram per liter (mg/L).
Sources: Chevron 2007d, LARWQCB 2006

Bacterial monitoring is regularly conducted at Stations immediately adjacent to the surfzone and on the shoreline (Stations S1, S3, S5, RW1, RW3, and RW5 in Figure 4.2-6) as part of the monitoring program for the Refinery's NPDES discharge. Low but detectable densities of enterococci, and fecal and total coliform, are occasionally found in the shoreline samples, and less often in offshore samples.

Sediment Physicochemistry

Sediment properties lend insight into the seafloor environment, as it currently exists near the Marine Terminal, and help quantify potential future impacts from the Project and its alternatives. Sediment grain-size distributions reflect the integrated influence of a wide variety of oceanographic, chemical, and biological processes. For example, the shape and amplitude of the grain-size distributions record the relative strength of competing erosional and depositional processes as they vary throughout Santa Monica Bay. They also can be used to estimate the site-specific tendency for resuspension of surficial sediments and, once suspended, the rate at which they settle back to the seafloor. These properties can be used to determine the duration and spatial extent of turbidity plumes generated by Project activities.

The amount of silt and clay in seafloor sediments also directly affects the composition of the infaunal community that resides within those sediments; although the precise mechanism for the relationship is rarely clear (Snelgrove and Butman 1994). In addition, natural variation in trace-metal concentrations has been correlated with the fine-sediment fraction and, along with aluminum and iron, has been used to normalize metal concentrations to remove naturally occurring trends and reveal anthropogenic influences (Dossis and Warren 1980, Horowitz and Elrick 1987).

Benthic environments are important indicators of the presence of marine pollution because they are the principal reservoir for most contaminants that enter the ocean. Contaminants incorporated into seafloor sediments tend to have a long residence time because of the slow dispersive processes that prevail within pore waters. Infaunal organisms that live within seafloor sediments are continuously exposed to contaminants because they cannot easily escape the source of pollution. Sedentary infaunal organisms provide a food source for other more mobile organisms, such as finfish and shellfish. These trophic relationships can lead to bioaccumulation of contaminants within the marine food chain.

Physical Properties

Most of the seafloor within Santa Monica Bay consists of unconsolidated sediment with silt and clay as the predominant size fraction from the 70-foot (21-m) isobath to the basin floor (Gardiner et al. 2003). Sandy substrates are restricted to the innermost shelf although sand is also present on Short Bank in the center of the Bay (see Figure 4.2-19). Cobble and gravel substrates are restricted to the innermost shelf near Point Dume in the north and Palos Verdes in the south. Patches of coarse sediment are also interspersed throughout the deeper portions of the Bay, where internal bores have winnowed finer surficial sediments and exposed underlying granules that are more resistant to resuspension.

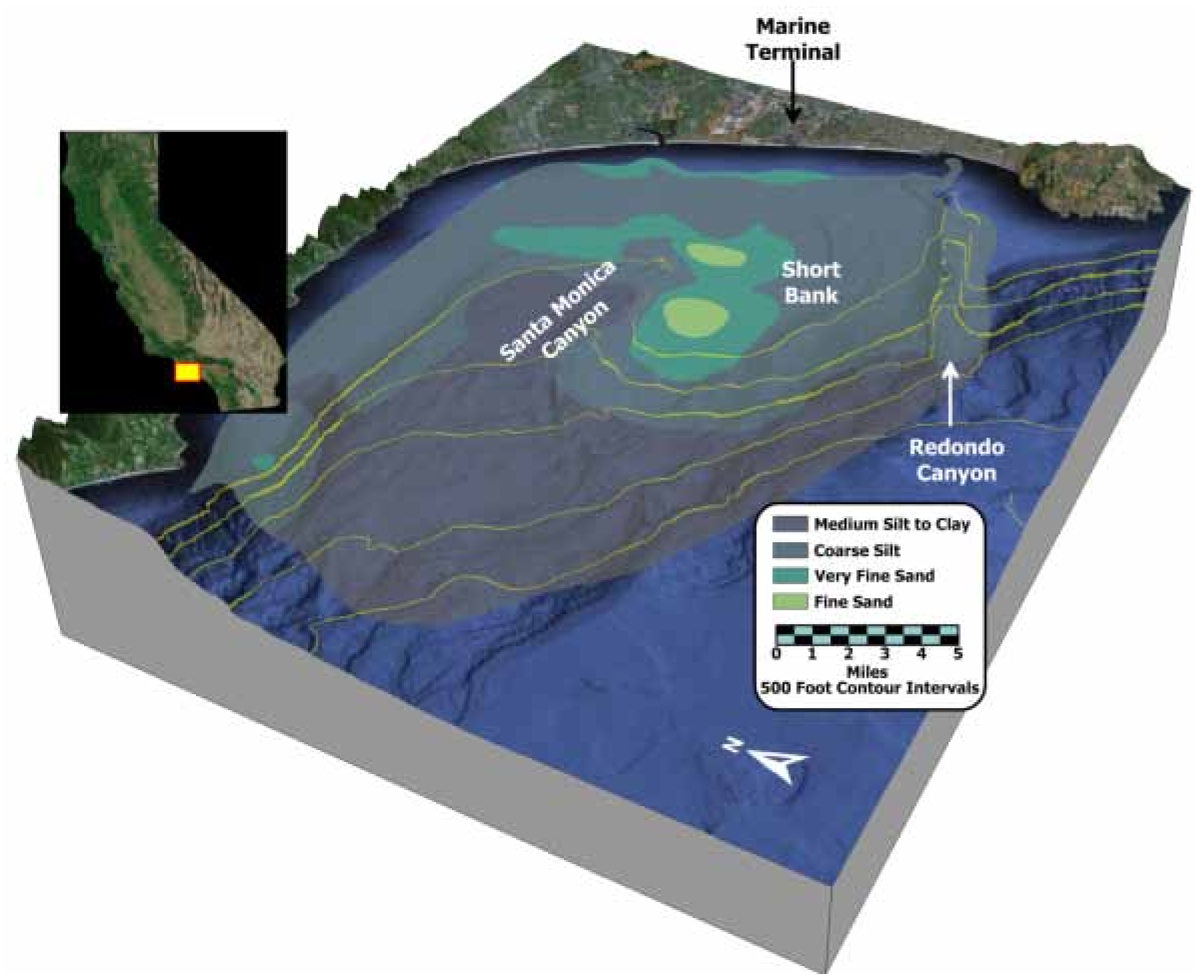
Surficial sediments near the Marine Terminal tend to be better sorted and larger in diameter than offshore sediments due to erosion, transport of sand from terrestrial areas, and strong oscillatory flows generated by shoaling surface-gravity waves. Sediments that have experienced energetic reworking tend to be better sorted with larger median grain sizes.

Near the Marine Terminal, surficial sediments consist of platykurtic, coarsely skewed, well-sorted very fine sands (see Figure 4.2-20). Although the change is slight, particle diameter steadily decreases with increasing depth and distance from shore along the pipeline corridor to Berth 4. At Station RW5, which is situated nearest the shoreline in water 20 feet (6.1 m) deep, the median grain-size is 118.1 microns (µm). The terminal velocity of particulates of this size in seawater is approximately 2.2 feet per minute (0.69 meters/minute [m/min]). The median diameter of sediments at Station RW16 near the Terminal Berths is 106.9 µm. Because of their smaller diameter, these sediments are expected to settle at a slower rate of 1.8 feet per minute (0.56 m/min). Near the Marine Terminal, if surficial sediments were displaced all the way to the sea surface, more than half would settle out of the 70-foot water column and be would be re-deposited on the seafloor in approximately 38 minutes. Furthermore, because the sediments are well sorted, the majority of granules are close to the median diameter, and 95 percent of the suspended sediments would reach the seafloor in less than 1 hour and 22 minutes.

Chemical Properties

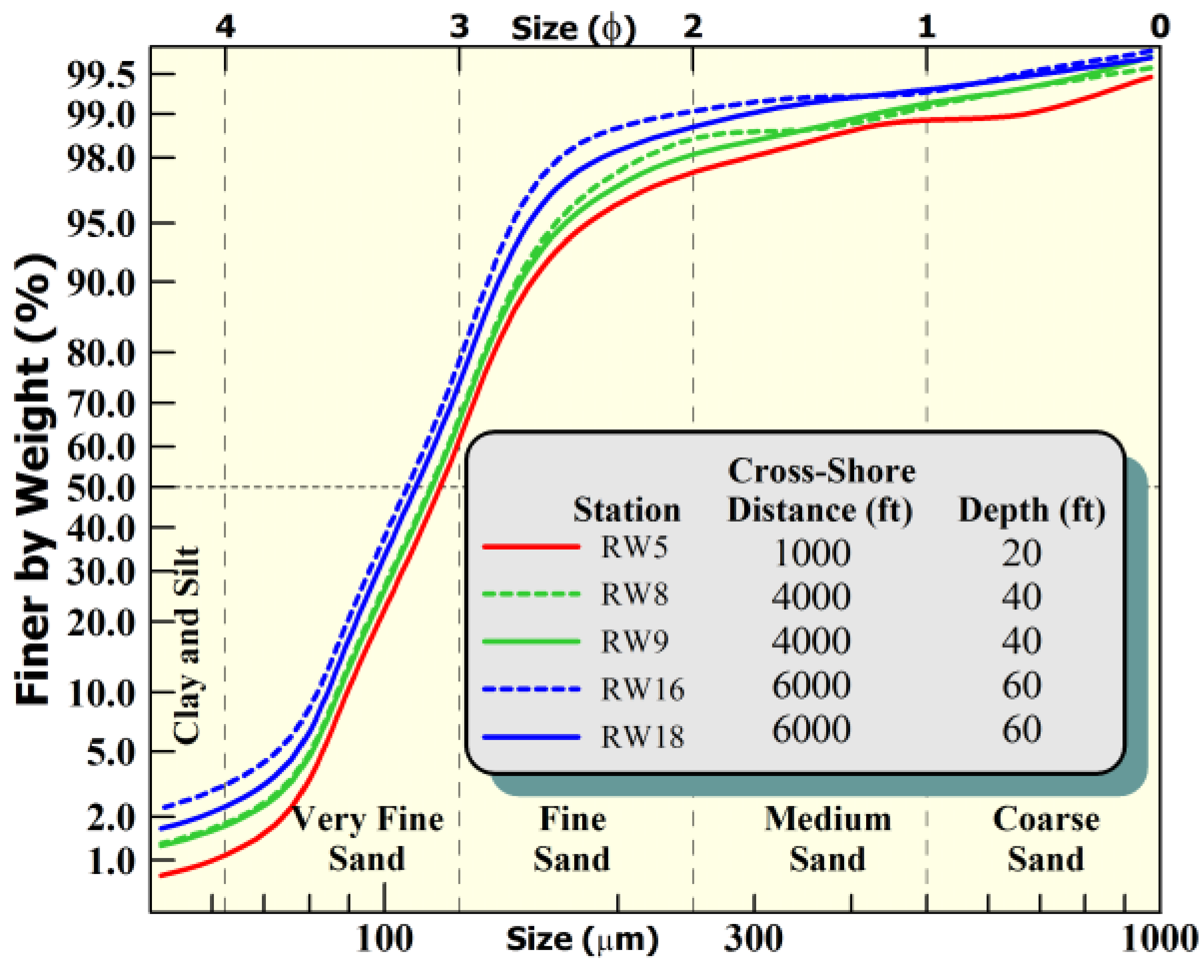
Sediment quality near the Marine Terminal is of interest because activities associated with the Project and its alternatives could potentially resuspend surficial sediments, thereby mobilizing any entrained contaminants into the water column. However, sediment-quality evaluations based on site-specific chemical properties need to distinguish between synthetic organic compounds and trace metals. In contrast to synthetic compounds, the presence of trace metals within seafloor sediments is not necessarily indicative of anthropogenic input. Most trace metals are found in detectable concentrations within naturally occurring mineral deposits, and some are even needed by marine organisms to survive. However, elevated levels of certain trace metals can be indicative of anthropogenic input, and excessive levels can cause deleterious effects in marine organisms.

Figure 4.2-19
Sediment Types in Santa Monica Bay



Source: Edwards et al. 2003

Figure 4.2-20
Grain-Size Distributions along the Marine Terminal Pipeline Corridor



Note: Figure 4.2-6 shows station locations.
Source: Chevron 2007d

Sediments within certain areas of Santa Monica Bay contain elevated concentrations of both organic contaminants and trace metals. They arise because of a long history of contaminant input from the adjacent, heavily populated coastline. However, the sources of contaminant input to Santa Monica Bay have changed dramatically over the last three decades, principally due to improved treatment and better source control by municipal wastewater dischargers (Bay et al. 2003b). Historically, municipal dischargers were a major source of contamination in Bay sediments, particularly near the Hyperion Treatment Plant outfalls and on the slope of Redondo Canyon, where the northward-flowing Southern California Countercurrent transported contaminants from the White Point outfall on the Palos Verdes Peninsula. However, reductions in sediment contaminant concentrations within recent depositional strata near the Hyperion outfall system have been largely restricted to organic compounds, such as polychlorinated biphenyl (PCB) and dichlorodiphenyltrichloroethane (DDT), rather than trace metals. In fact, throughout the Bay average sediment-metal concentrations have not changed appreciably since 1970.

Whereas surficial sediments throughout most of Santa Monica Bay have not been found to be particularly toxic to marine organisms, bioassays conducted on subsurface sediments near current or former Hyperion wastewater outfall locations exhibited significant toxicity (Greenstein et al. 2003). Contaminant concentrations within these toxic subsurface sediment samples were consistent with responses predicted from sediment-quality guidelines. The two most common guidelines for predicting biological effects from a given sediment chemical are the effects-range low (ERL) concentration, below which toxic effects are not expected, and the effects-range median (ERM) concentration, above which adverse biological effects can be expected (Long and Morgan 1991, Long et al. 1995). Adverse effects are occasionally observed in sediments with chemical concentrations that lie between the ERL and ERM guidelines.

Elevated concentrations of anthropogenic metals, such as lead, and organic pollutants are also found on the seafloor offshore Ballona Creek (Schiff and Bay 2003). In contrast to point-source wastewater discharges, the accumulation of anthropogenic sediment contaminants offshore Ballona Creek results from stormwater runoff. Rainfall during winter storms produces turbid, freshwater plumes that extend 2.5 to 4.5 miles (4 to 7 km) offshore, six miles (10 km) alongshore, and persist for three days (Washburn et al. 2003). Although the plumes only occupy the upper 33 feet (10 m) of the water column, their depositional footprint is apparent in the seafloor sediments as increased organic and fine fractions. The plumes usually extend northward along the coast in response to wind and Coriolis forcing. Consequently, contaminants within the depositional footprint can be discerned farther upcoast (2.5 mile [4 km]) than downcoast (1.2 miles [2 km]). The Marine Terminal is 3.5 miles (5.6 km) downcoast of the creek mouth, so its sediments have not been materially contaminated by the outflow.

Low contaminant concentrations and low toxicity within the Marine Terminal sediments are consistent with the limited downcoast extent of contaminants within the Ballona Creek depositional footprint and with limited influence from legacy contamination originating from the Hyperion and White Point outfalls. NPDES monitoring of sediments surrounding the Refinery's discharge confirms the low level of contaminants in the sediment near the Marine Terminal (see Table 4.2-3). Table 4.2-3 provides a ten-year history of trace-metal concentrations at the monitoring station closest to the Terminal's berths (Station RW16 in Figure 4.2-6). It lies equidistant (0.4 miles [0.61 km]) from each of the berths. Stations closer inshore exhibit similar long-term mean chemical concentrations within surficial sediments. All but a few anomalous individual measurements at these other stations were near the mean concentrations listed in the table. Most slightly elevated metal concentrations occurred at nearshore stations during the strong El Niño of 1997 and 1998. One notable exception was a highly anomalous mercury concentration of 1 milligram per kilogram (mg/kg), measured in a sediment sample collected in 2007 at Station RW6. That concentration exceeded all the sediment quality guidelines and was inconsistent with concentrations measured in the prior 15 years, which were at least an order of magnitude lower.

Table 4.2-3
Record of Trace-Metal Concentrations Measured in Seafloor Sediment Samples Collected Near the Marine Terminal Berths

	As	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Zn
Year										
1998	ND	ND	19.0	2.6	5.0	0.048	6.7	ND	ND	13
1999	2.0	ND	6.6	1.6	2.9	0.059	3.7	ND	ND	13
2000	2.7	ND	14.0	4.5	7.6	0.056	7.0	ND	ND	20
2001	2.9	ND	11.0	3.6	6.9	0.060	5.7	ND	ND	21
2002	2.8	ND	12.0	2.3	5.9	0.044	5.9	ND	ND	15
2003	2.5	ND	11.0	2.8	5.2	0.057	5.5	ND	ND	16
2004	2.3	ND	9.8	2.8	4.5	0.044	5.2	ND	ND	13
2005	ND	ND	9.5	2.3	3.2	0.029	5.4	ND	ND	13
2006	2.8	ND	9.5	3.2	3.7	0.032	4.9	ND	ND	13
2007	2.2	ND	9.9	3.3	5.5	0.110	5.8	ND	ND	14
Average	**<3.3**	**<0.5**	**14.4**	**3.7**	**6.4**	**0.067**	**7.3**	**<2.0**	**<1.0**	**20**
SCB	**5.7**	**1.1**	**62**	**24**	**11**	**0.11**	**31**	**—**	**0.38**	**81**
ERL	**8.2**	**1.2**	**81**	**34**	**46.7**	**0.15**	**20.9**	**—**	**1.0**	**150**
ERM	**70**	**9.6**	**370**	**270**	**218**	**0.71**	**51.6**	**—**	**3.7**	**410**

Notes: Abbreviations for chemical elements are: As=Arsenic, Cd=Cadmium, Cr=Chromium, Cu=Copper, Pb=Lead, Hg=Mercury, Ni=Nickel, Se=Selenium, Ag=Silver, and Zn=Zinc.
Data are for Station RW16 whose location is shown in Figure 4.2-6.
The less-than symbol (“<”) indicates that the metal was not detected above the reporting limit.
Averages are computed after logarithmic transformation after adjustment to dry weight by a nominal, 24.6 percent-moisture content typical of very fine benthic-sediment samples (City of Morro Bay 2009).
The “SCB” comparison concentration is the area-weighted mean (SCCWRP 2006). Individual concentrations are reported in milligrams per kilogram – wet weight (mg/kg-wet), while averages and comparison concentrations are dry weight.
The “**—**“ symbol listed under selenium indicates that there is no ERL or ERM sediment guideline established for that element.
Source: Chevron 2007d

Except for the anomalous mercury measurement, sediment-chemistry monitoring near the Marine Terminal confirms the generally low level of contamination within Marine Terminal sediments. Trace-metal concentrations found in individual sediment samples were generally below mean concentrations found within sediments throughout the SCB and well below sediment-quality guidelines that would characterize the sediments as toxic to marine organisms. Although silver was detected in only one of the 276 measurements, at a concentration of 1.4 mg/kg in 2006, its reporting limit of 1 mg/kg was above the SCB mean, and equal to the ERL. However, both the reporting limit and the one measurable concentration were well below ERM levels where adverse biological effects would be expected. No detectable concentrations of synthetic organic contaminants were found within Marine Terminal sediment samples collected in 2006 and 2007, which was the only organic chemistry data available for review in this environmental assessment.

Pollutant Loading

Pollutants enter the Santa Monica Bay through river drainages, municipal and industrial wastewater discharges, dumping, air emissions, chemical spills, vessel discharges, and surface runoff. Increasing urbanization of the adjacent watershed in the early and middle part of the twentieth century imposed numerous environmental stressors on the Bay (Dojiri et al. 2003). Pollutant discharges to the Bay stabilized and began to decline after passage of the Clean Water Act in 1972. Since then, the predominant source of pollutant loading shifted from point-source wastewater discharges to non-point-source urban runoff (Lyon and Stein 2008). However, the legacy of pollutant discharge has left contamination in more than 90 percent of Bay's sediments, often at levels of potential biological concern (Schiff 2000).

Point-Source Discharges

There are 193 NPDES-permitted discharges to Santa Monica Bay (LARWQCB 2007a). However, the seven largest dischargers contribute the vast majority of wastewater volume to the Bay. They include two municipal wastewater treatment plants, three coastal power-generating stations, and Chevron's El Segundo Oil Refinery (see Table 4.2-4).

Flow rates, constituent concentrations, and mass emissions from the two large municipal wastewater treatment plants, the Hyperion Treatment Plant and the Joint Water Pollution Control Plant (JWPCP), have significantly declined since 2003, when both plants achieved full-secondary treatment. Nevertheless, they remain by far, the largest point sources of contaminant input to Santa Monica Bay, mainly due to the large volumes they discharge daily. The combined discharge of contaminants to the Bay from all other known point sources, such as industrial facilities, power generating stations, offshore oil platforms, and dredge material disposals, is minor compared to these two large wastewater facilities. Minor point-source discharges are presently estimated to contribute less than two percent of total pollutants discharged into Santa Monica Bay (LARWQCB 2007b). Only non-point source inputs, such as stormwater runoff, constitute a greater source of contaminants (Schiff et al. 2000).

However, this was not always the case. Legacy pollution from wastewater treatment facilities has accumulated near existing and decommissioned outfalls offshore of Palos Verdes and Playa del Rey. In particular, deposition of DDT and PCB compounds on the Palos Verdes Shelf has led to the area’s designation as a Superfund site, with attendant human health advisories for consumption of certain finfish species caught within a localized area.

Hyperion Treatment Plant

The Hyperion Treatment Plant is 0.3 miles (0.5 km) upcoast from the Marine Terminal (see Figure 4.2-5). Hyperion has three outfalls in the Project vicinity: a five-mile (8.0-km) outfall in regular use, a one-mile (1.6-km) emergency outfall, and an abandoned seven-mile (11.3-km) sludge outfall. Presently, unchlorinated, secondary treated effluent is discharged on a regular basis through the five-mile (8.0-km) outfall that terminates in a Y-shaped diffuser structure 187 feet (57 m) beneath the sea surface (Figure 4.2-2). The one-mile (1.6-km) outfall discharges south of the five-mile (8.0-km) outfall’s corridor in water 50 feet (15.2 m) deep. Use of this outfall is permitted for the emergency discharge of chlorinated, secondary treated effluent during extremely high flows, power failures, and preventive maintenance, such as routine opening and closing of the outfall gate valves for exercise and lubrication. However, during intense storms, especially when associated with plant power outages, direct discharge of undisinfected stormwater overflow is also permitted through this outfall. Hyperion abandoned its seven-mile sludge outfall in place in 1987; its corridor extends north of the five-mile (8.0-km) outfall’s corridor.

Table 4.2-4
Mass Emission from Major Point-Source Discharges to Santa Monica Bay

	Wastewater		Power			Chevron Refinery
	Hyperion	JWPCP	Scattergood	El Segundo	Redondo	
Flow (MGD)	315	322	254	412	661	6.7
High-Emission Constituents (MT)						
BOD (5-day)	8300	2800	—	—	—	—
TSS	8900	6900	—	—	—	ND
Residual Chlorine	—	—	—	48	67	—
Ammonia Nitrogen	16000	14000	—	ND	ND	21
O&G	200	ND	—	—	—	ND
Organic Nitrogen	1686	2541	—	—	—	—
Nitrate Nitrogen	9.6	2.9	—	ND	93	—
Total Phosphorus	1282	352	—	—	—	—
Phenol	—	2.6	—	—	—	ND
Zinc	9.7	2.1	5.6	14	—	ND
Copper	9.2	2.7	ND	1.2	ND	0.019
Nickel	3.7	8.5	ND	ND	ND	0.013
Lead	1.8	ND	ND	ND	ND	ND
Chromium	0.65	ND	—	3.0	ND	ND
Cyanide	0.7	1.8	—	—	—	ND
Silver	0.62	ND	ND	ND	ND	ND
Arsenic	1.2	0.61	ND	ND	ND	0.217
Cadmium	0.08	ND	1.2	ND	ND	ND
Trace Constituents (MT)						
Selenium	0.46	3.1	ND	ND	ND	0.93
Mercury	0.003	ND	ND	ND	ND	ND
Total DDT	0.13	ND	—	—	—	ND
PCB	ND	ND	—	—	—	ND
PAH	0.023	0.0089	—	—	—	ND

Notes: — = Not reported, BOD = Biochemical Oxygen Demand, MGD = Million Gallons per Day, MT = Metric Tons = 1000 kg, ND = Below detectable limits or no detectable difference between inlet and outlet samples, O&G = Oil and grease
Sources: Steinberger and Schiff 2003, Steinberger and Stein 2004, Lyon et al. 2006

The Hyperion Treatment Plant has a design flow capacity of 450 million gallons per day (MGD), although the average flow through the facility in 2003 was 315 MGD (see Table 4.2-4). The Plant has been discharging to the Bay for 125 years. Throughout the first part of the twentieth century, the Plant's effluent quality declined as increases in wastewater inflow outpaced plant modifications. In 1985, the quality of effluent reached an all-time low when suspended-solid concentrations peaked. Total contaminant loading to the marine environment was markedly reduced when sludge disposal was terminated in 1987. Effluent quality dramatically improved with the upgrade of the facility to full secondary treatment in 1998. As a result, emissions of all constituents, including total suspended solids (TSS), biochemical oxygen demand (BOD), metals, and organics, were reduced (Schiff et al. 2000). Since that time, increased source control and pretreatment of discharges into the collection system have further improved effluent quality

Although the Plant's wastewater volume discharged in 2003 was less than the JWPCP discharge, the concentrations of major effluent constituents were higher and resulted in the discharge of greater loads of oxygen-demanding material (BOD in Table 4.2-4), TSS, oil and grease (O&G), and ammonia.

<u>Joint Water Pollution Control Plan</u>

Discharges by the JWPCP have also affected water and sediment quality within Santa Monica Bay even though its outfall at White Point is outside of the Bay on the Palos Verdes Peninsula. Up to 330 MGD of wastewater from communities not serviced by Hyperion are discharged through a two-mile (3.2-km) outfall pipe that terminates in water depth similar to Hyperion's five-mile (8.0-km) outfall. Although the White Point outfall does not discharge directly into Santa Monica Bay, prevailing northwestward currents carry effluent contaminants into the Bay where they have impacted seafloor sediments. For example, high levels of DDT in the southern portion of the Bay have been attributed to transport of past JWPCP discharges at White Point. As with Hyperion, the quality of the White Point effluent has improved dramatically over the last 20 years but its long legacy of sediment contamination remains problematic (Lee and Wisberg 2002).

The greatest recent improvement to JWPCP effluent occurred when its secondary treatment capacity increased from 70 percent in 2002 to 100 percent in 2003 (Lyon et al. 2006). Between 2002 and 2004, 96 percent of the effluent constituents exhibited a reduction in mass emission or their concentrations were reduced to undetectable levels. The only constituent that showed an increase in mass discharge during this period was total PAH, which increased from undetectable levels in 2002 to 8.9 kg in 2004. Total metals emissions from JWPCP decreased 64 percent between 2002 and 2004. Emissions of general constituents during this period also showed a median decrease of 67 percent, with O&G, BOD, nitrate-N, phosphate-P, and TSS exhibiting the most significant declines. Among the organic constituents, total phenolic compounds decreased 97 percent, while chlorinated and nonchlorinated phenols and DDT declined to undetectable levels.

Power Generating Facilities

Three electric power-generating stations, including the Scattergood and El Segundo generating stations that border the Marine Terminal, use seawater from the Bay to cool steam condensers (see Figure 4.2-5). They discharge warmed seawater back to the Bay, along with a small amount of in-plant waste. Dissolved pollutant concentrations generally remain low in this process and, while the once-through cooling requires high flow rates, emission of in-plant waste is small compared to the wastewater treatment facilities (see Table 4.2-4). Along with the Redondo Beach Generating Station, these three facilities discharged 1,300 MGD of once-through cooling water in 2000, a rate four-fold higher than the Hyperion Treatment Plant.

The Scattergood Steam Generating Station discharges through an outfall that extends 0.4 miles (0.6 km) offshore, with a discharge 15 feet (4.6 m) beneath the sea surface. The maximum allowable discharge rate is 495 MGD, with an average design flow of 324 MGD. During 2000, as in most years, it operated well below capacity. Once-through cooling water makes up 99.9 percent of the discharge, with the remaining 0.1 percent from in-plant wastewater. Cooling water pipelines are also periodically injected with liquid chlorine for 40 minutes per eight-hour work shift to control biological growth.

The El Segundo Power Generating Station operates two outfalls that discharge 0.4 miles (0.6 km) offshore. The two power units that discharge through the northernmost outfall ceased commercial operation in January 2003, but at least one circulating water pump operates continuously to support other facility operations. The design flow through the two remaining units is 398.6 MGD. Consequently, the average annual flow rate of 412 MGD reported for 2000 in Table 4.2-4 includes a significant contribution from the partially mothballed units. Current and projected flow rates are likely to remain well below those reported in Table 4.2-4, and the associated emission of constituents is likely to be much lower as well.

The Redondo Beach Generating Station operates two outfalls as well. These closely aligned outfalls discharge 0.25 miles (0.4 km) and 0.28 miles (0.45 km) offshore, just outside the King Harbor Breakwater. Water depth at that location is 35 feet (10.7 m), although the 15-foot (4.6-m) risers reduce the discharge depth to 20 feet (6.1 m). During 2000, the discharge rate through the two outfalls was equal to the combined discharge of the two other power-generating stations. Typical of other generating stations, the cooling water comprises more than 99 percent of the facility's total discharge.

Despite the large seawater throughput of all three of these once-through-cooling power-generating stations, they introduce relatively small chemical contaminant loads to the marine environment. Nevertheless, they are responsible for marine water-quality and biological impacts that are unrelated to contaminant loads. Since 1975, the California Thermal Plan has regulated thermal impacts from power-plant discharges (SWRCB 1975).

Marine biological impacts from impingement and entrainment have been of particular regulatory interest recently, and on May 4, 2010, the State Water Resources Control Board (SWRCB) adopted a Policy on the use of coastal waters for power plant cooling that could profoundly affect future seawater intake at all three power plants (SWRCB 2010). When implemented, the policy would require a 93 percent reduction in the design intake-flow rate, commensurate with closed-cycle wet cooling systems. Once-through cooling can cause adverse impacts when aquatic organisms are trapped against a facility's intake screens (impingement) and when smaller organisms, such as larvae and eggs, are drawn through the facility's entire cooling system (entrainment). The SWRCB's proposed technology-based standards are designed to mitigate these adverse effects, and all three plants are already implementing some of these technologies. All three plants utilize deepwater offshore intakes with velocity caps, which can reduce impingement by more than 90 percent. In 2008, the Scattergood Generating Station enhanced its offshore intake by restricting openings to further limit impingement. The El Segundo Generating Station has filed a permit application to repower Units 1 and 2 with dry cooling. Both facilities are expected to fully comply with the regulations by 2017.

<u>El Segundo Refinery</u>

The Chevron El Segundo Refinery is the only major industrial facility discharging directly to the Bay. It discharges secondary-treated wastewater through a 0.6-mile (1-km) outfall that terminates approximately halfway to the Marine Terminal moorings (see

Figure 4.2-6). The influent to the Terminal's treatment facility includes petroleum-processing wastewater, boiler water, shallow recovery-well groundwater, and stormwater runoff.

As with the power plants, the Refinery normally emits only small contaminant loads compared to the other major point-source dischargers in Santa Monica Bay (see Table 4.2-4). Although contaminant concentrations within the Refinery discharge may have been higher than those of the power plants in the past, the discharge volume was 38-times less than that of Scattergood, the next largest major discharger. Mass loading is a function of both a contaminant's concentration and flow rate, so the Refinery's very low discharge volume more than offsets higher contaminant concentrations and results in a mass-emission well below other large dischargers in the region. In addition, recent improvements in treatment performance have reduced contaminant concentrations within the Refinery's routine discharge, thus further reducing its mass emission of contaminants (Steinberger and Schiff 2003). From 1995 to 2000, decreases in Refinery pollutant loads ranged from three percent for arsenic, to essentially 100 percent for TSS, O&G, cadmium, chromium, lead, silver, zinc, and phenolic compounds. Mercury emissions from the Refinery did not change between 1995 and 2000, but copper emissions decreased 41 percent. Selenium emissions from El Segundo increased inexplicably 49 percent between 1995 and 2000, but remained within the permitted limits.

In contrast to other major point sources, the Refinery's wastewater characteristics vary over time due to changes in the mix of source water. Usually, wastewater generated by the Refinery process constitutes the vast majority of daily flow. Often, however, the process water is comingled with wastewater from other sources, such as treated wastewater extracted as part of an extensive remediation project of hydrocarbon-contaminated groundwater that lies beneath the Refinery.

In addition, effluent occasionally includes a large volume of stormwater runoff. An upset in the Refinery's effluent diversion system during a major rainstorm in January 1998 led to the only notable violation of NPDES discharge requirements. The incident occurred after a major rainstorm deposited 10.8 million gallons of stormwater into the Refinery's stormwater collection system. Due to a malfunction of a diversion pump, the treatment system could not adequately accommodate the high flow rates and stormwater entered an overflow collection basin whose outlet trough contained free oil. The discharge generated a visible oil sheen on the sea surface for 14 days. To prevent recurrence of the event, the Refinery subsequently upgraded its pumping and instrumentation systems and implemented an oil-recovery program for the overflow collection basin.

Non-Point-Source Discharges

With the passage of Federal Water Pollution Control Amendments in 1972, oversight of point-source discharges improved dramatically. Because of associated improvements in treatment, contaminant emissions to the SCB have decreased profoundly since then (Lyon and Stein 2008). Although the SCB's coastal population grew by 56 percent and point-source discharge volumes increased by 31 percent between 1971 and 2000, mass emission of most effluent constituents decreased by more than 65 percent. As point-source treatment improved, the relative contribution of contaminants from non-point sources increased. Presently, non-point discharges are the primary source of pollutant loading to the SCB during major storm events.

Freshwater Runoff

Unlike most of the country, storm-drain systems that feed into Santa Monica Bay are independent of the sewer collection system. Consequently, untreated urban runoff flows directly into the Bay at freshwater outlets that have been found to contribute high levels of bacterial contamination (Noble et al. 2003, Stein and Tiefenthaler 2005). Stormwater runoff also affects the physical stratification and circulation of Bay waters, as well as the distribution and concentration of nutrients, suspended sediments, phytoplankton, pollutants, and pathogens (Washburn et al. 2003). More than 95 percent of the annual runoff volume to the Bay is discharged during major rainstorms, mostly between late fall and early spring (Schiff et al. 2000).

Pollutant and bacteria concentrations discharged into the Santa Monica Bay are highest during the first months of the rainy season. Initial rainfall events are first to flush contaminants that accumulated onshore during long dry spells.

One of the most apparent impacts from stormwater runoff is the temporary closure of beaches when seawater samples exceed bacterial standards. Whereas 96 percent of the SCB shoreline meets water-quality standards during dry weather, 58 percent of shoreline samples fail to meet the bacterial standards during wet weather (Noble et al. 2003). Areas near storm drains have a disproportionately high incidence of bacterial contamination compared to other shoreline areas. In contrast to several beaches near Marina del Rey, which individually constitute more than five percent of the bacterial exceedances, the shoreline at the Marine Terminal only accounts for two percent of the exceedances during both wet and dry periods (Schiff et al. 2003).

Repeated closures of Marina del Rey beaches are related to their proximity to the mouth of Ballona Creek, a known source of contaminants (Bay et al. 2003a). Of the two large watersheds that drain into Santa Monica Bay, the Ballona Creek watershed is the largest (see Figure 4.2-3). It drains a 130-square-mile (340 km^2) area that is 83 percent developed. Although the Malibu Creek watershed is almost as large, it drains a largely natural landscape with only four percent impermeable surface area. As a result, Malibu Creek outflow is rarely toxic to marine organisms, whereas the drainage from Ballona Creek can be toxic as far away as 2.5 miles (4.0 km) from its mouth (Schiff and Bay 2003).

In 2002, Ballona Creek was listed as an impaired water body that flows into a marine protected area, namely, Santa Monica Bay. Waters within Ballona Creek have detectable levels of arsenic, cadmium, chromium, copper, nickel, zinc, and lead with concentrations of cadmium, copper, nickel, zinc, and lead exceeding state water-quality criteria at least occasionally (Stein and Tiefenthaler 2005). The Ballona Creek watershed is also considered impaired because of coliform, trash, PCB, and legacy pesticides, such as DDT, chlordane, and dieldrin. As a result of these pollutant loads, sediments within the Marina del Rey Entrance Channel and the Ballona Creek mouth have elevated concentrations of DDT, PCB, copper, mercury, nickel, lead, zinc and chlordane, dieldrin, and chlorpyrifos, and they are toxic to aquatic organisms.

Although changes in sediment texture, organic content, and increased sediment contamination are also evident farther offshore of Ballona Creek, stormwater discharges have not perceptibly degraded the resident benthic community. The community has abundance, species richness, biodiversity, and benthic response index similar to shallow water areas distant from creek mouths throughout the SCB. There is neither a preponderance of pollution-tolerant species, nor a lack of pollution-sensitive species, offshore of either the Malibu or Ballona creek mouths.

Other Non-Point Sources

Certain contaminants also enter the Bay through atmospheric deposition and from its two marinas, Marina del Rey and King Harbor. Aerial deposition is an important source of lead, nickel, zinc, mercury, and PAH. Marinas can be a significant source of O&G, debris, copper-containing antifouling bottom paints for boats, mercury, arsenic, zinc, chromium, lead, and tributyltin.

Atmospheric and oceanographic measurements analyzed in support of the Santa Monica Bay Restoration Plan found that aerial deposition is a significant contributor to the overall pollutant load to the Bay, especially trace metals such as lead, chromium, and zinc (Stolzenbach et al. 2001, Lu et al. 2003). On an annual basis, daily dry deposition of metals onto the Bay's sea surface and watershed far exceeds the amount deposited during rain events. Chronic daily dry deposition is also far greater than cumulative deposition during Santa Ana conditions, when a large volume of polluted air is blown offshore from the Los Angeles Basin. Most of the mass of metals deposited by dry deposition originates as relatively large aerosols (>10 µm) generated by widespread area sources such as off-road vehicles, including boats, planes, and construction vehicles within the watershed.

4.2.2 Regulatory Setting

Federal, State, and local plans and policies regulate water quality in the region surrounding the Marine Terminal. Santa Monica Bay was included in the National Estuary Program in 1989, recognizing its national importance. A watershed plan was developed in 1995 and the Santa Monica Bay Watershed Commission was established in 2004 to oversee implementation of the Plan. Despite its relatively small size compared to watersheds in other parts of the country, the Santa Monica Bay Watershed includes diverse geological and hydrological characteristics, habitat features, and human activities. Consequently, every beneficial use defined in the Los Angeles Regional Basin Plan, except preservation of biological habitats, has been identified in one or more of the water bodies within the watershed (LARWQCB 2007a). Although many of these beneficial uses have been impaired for years, some of the impaired areas show signs of recovery.

Federal

Clean Water Act

The Federal Clean Water Act (33 U.S.C. 1251 et seq.) (as amended) provides for delegation of certain responsibilities in water-quality control and water-quality planning to the states. In California, the Environmental Protection Agency (EPA) and the California SWRCB have agreed to such delegation and regional boards implement portions of the Clean Water Act, such as the NPDES program. The aim of the Clean Water Act of 1977 is to restore and maintain the chemical, physical, and biological integrity of the nation's waters.

The Federal Clean Water Act requires that any point-source discharges of pollutants to U.S. water must conform with an NPDES permit. NPDES permits establish effluent limitations that incorporate various requirements of the Clean Water Act designed to protect water quality.

Section 303(d)

Section 303(d) of the Clean Water Act requires states to identify specific water bodies where water-quality standards are not expected to be met after implementation of effluent limitations on point sources. For all 303(d)-listed water bodies and pollutants, pollutant-loading limits for point and non-point sources must be developed and adopted. The EPA approved the State's 303(d) list of impaired water bodies on July 25, 2003, which included the following pollutant impairments of Santa Monica Bay: DDT in tissue and sediment, PAH in sediment, PCB in tissue and sediment, chlordane, elevated coliform density, debris, sediment toxicity, fish consumption advisories, and beach closures.

Section 316

Three major power-generating stations withdraw large volumes of seawater from Santa Monica Bay and discharge warmed seawater back to the Bay. Two of these generating stations are immediately adjacent to the Refinery (see Figure 4.2-5). Section 316(a) of the Clean Water Act regulates the thermal effects of discharges from these facilities by applying best available technologies to minimize adverse impacts and through requirements for demonstrating that a balanced indigenous community of aquatic organisms is protected and maintained within receiving waters.

Section 316(b) of the Clean Water Act requires the determination of whether the withdrawal of cooling water causes or has the potential to cause adverse environmental impacts on aquatic populations and communities because of impingement and entrainment. Once-through cooling used by the Bay's three power-generating facilities is of particular regulatory interest because of the volume of water cycled through the plants. The EPA developed new regulations under Section 316(b) that require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. The Federal regulations are being developed in three phases: Phase I, completed in late 2001, applied to new facilities. Phase II, issued in February 2004, consisted of regulations applicable to existing large facilities, defined as those withdrawing more than 50 million gallons of cooling water per day. Phase III promulgated regulations applicable to smaller existing facilities in 2006. However, in January 2007, the U.S. Second Circuit Court of Appeals decided in *Riverkeeper, Inc. v. EPA* that many parts of the Phase II rule were invalid or needed to reevaluated by the EPA and, as of March 20, 2007, the Phase II rule was suspended. The California SWRCB subsequently stepped in to fill the regulatory gap left by the suspension of the Phase II rule (SWRCB 2009).

Oil Pollution Act

The Oil Pollution Act of 1990 established a single uniform Federal system of liability and compensation for damages caused by oil spills in U.S. navigable waters. The Act requires removal of spilled oil and establishes a national system of planning for and responding to oil spill incidents. It includes provisions to:

- Improve oil-spill prevention, preparedness, and response capability;
- Establish limitations on liabilities for damages resulting from oil pollution;
- Provide funding for natural resource damage assessments;
- Implement a fund for the payment of compensation for such damages; and
- Establish an oil pollution research and development program.

The Secretary of the Interior is responsible for spill prevention, oil-spill contingency plans, oil-spill containment and clean-up equipment, financial responsibility certification, and civil penalties for offshore facilities and associated pipelines in all Federal and State waters. The U.S. Coast Guard (USCG) was designated as the lead agency for offshore oil spill response, which includes responsibility for coordination of Federal responses to marine emergencies. The USCG is also responsible for enforcing vessel compliance with the Act.

International Maritime Organization Resolution A.868(20) and National Invasive Species Act

In 1997, the International Maritime Organization (IMO) adopted Resolution A.868(20) (Guidelines for the Control and Management of Ship's Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens). The key aspect of the Resolution is the development and maintenance of a ship-specific ballast-water management plan. Prior to 1997, Congress enacted the National Invasive Species Act of 1996. In 1999, the USCG published interim rules that were finalized in 2001. These regulations created mandatory ballast-water reporting requirements for qualified voyages into U.S. ports and voluntary ballast-water management practices. In 2004, these voluntary practices, for the most part, became mandatory, including a ballast-water management plan and training. In February 2004, the IMO adopted the International Convention for the Control and Management of Ship's Ballast Water and Sediments. This convention is not yet in force since only 14 percent of the required 35 percent of member nations have ratified the convention.

Vessel General Permit

On December 18, 2008, the EPA finalized an NPDES Vessel General Permit for discharges incidental to normal vessel operations (USEPA 2008). It requires U.S. and foreign-flagged commercial vessels longer than 79 feet and operating in U.S. waters to comply with a range of best management, inspection, monitoring, reporting, and recordkeeping practices for virtually every water-based waste stream generated by a ship, including ballast-water discharges. It regulates the discharge of aquatic nuisance species, nutrients, pathogens, O&G, metals, BOD, pH TSS, and other toxic and non-conventional pollutants with toxic effects. As a general permit, all eligible vessels are automatically authorized to discharge pursuant to the permit, but vessels greater than 300 tons, or having the capacity to hold or discharge more than 2,113 gallons of ballast water, must submit a Notice of Intent to the EPA within nine months of permit finalization to continue discharging.

The Vessel General Permit's best management practices (BMP) for ballast water include: restricting discharges to only those essential to the operation of the vessel; removal of sediment from ballast tanks in mid-ocean or at dry-dock; avoiding ballast-water uptake in areas of known pathogens; conducting mid-ocean ballast exchanges; and retaining all ballast water on board while in U.S. waters. Marine releases of ballast water, deck washdown, or vessel runoff with total hydrocarbon concentrations exceeding 15 parts per million (ppm) is prohibited.

Coastal Zone Management Act

The Coastal Zone Management Act of 1972, which was last amended in 1996 through the Coastal Zone Protection Act, regulates development and use of the nation's coastal zone by encouraging states to develop and implement coastal zone management programs. Coastal Zone Management Act regulations are recorded in 15 CFR 923 through 930. The roles of long-range planning and management of California's coastal zone were conferred to the State with implementation of the California Coastal Act in 1976, which was last amended on January 1, 2005. California Coastal Commission administrative regulations are recorded in 14 CCR (Division 5).

State

California Coastal Act

The California Coastal Act (Coastal Act) became law in 1976 to provide a comprehensive framework to protect and manage coastal resources. The main goals of the Act are to protect and restore coastal zone resources, to ensure balanced and orderly utilization of such resources, to maximize public access to and along the coast, to ensure priority for coastal dependent and coastal-related development, and to encourage cooperation between state and local agencies toward achieving the Act's objectives. This includes development and implementation by local governments of Local Coastal Programs that are consistent with the aims and goals of the Coastal Act, and certified by the California Coastal Commission. The Act's water-quality provisions would apply to the installation of new moorings, which are proposed as an alternative to the Project and would require a coastal development permit.

The Coastal Act contains policies to guide local and state decision-makers in the management of coastal and marine resources. The Act identifies protective measures for nearshore marine resources. Several provisions of the California Coastal Act serve to protect coastal water quality from point and nonpoint source pollution.

Coastal Act Section 30231 states:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Coastal Act Section 30232 states:

> *Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.*

Coastal Act Section 30235 states:

Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Existing marine structures causing water stagnation contributing to pollution problems and fishkills should be phased out or upgraded where feasible.

California Water Code

Section 13142.5 of the California Water Code provides marine water-quality policies stating that wastewater discharges shall be treated to protect present and future beneficial uses and, where feasible, to restore past beneficial uses of the receiving waters. The highest priority is given to improving or eliminating discharges that adversely affect wetlands, estuaries, and other biologically sensitive sites; areas important for water contact sports; areas that produce shellfish for human consumption; and ocean areas subject to massive waste discharge.

Porter-Cologne Water Quality Control Act

Since 1973, the California SWRCB and its nine Regional Water Quality Control Boards have been delegated responsibility for administering permitted discharge into the coastal marine waters of California. The Porter-Cologne Water Quality Act provided a comprehensive water-quality management system for the protection of California waters and regulated the discharge of oil into navigable waters by imposing civil penalties and damages for negligent or intentional oil spills. Under the Act, any person discharging waste, or proposing to discharge waste, within any region that could affect the quality of the waters of the State must report the discharge to the appropriate regional board. Pursuant to the Act, the regional board may then prescribe “waste discharge requirements” that add conditions related to control of the discharge. Porter-Cologne defines “waste” broadly, and the term has been applied to an array of materials, including non-point source pollution. When regulating discharges that are included in the Federal Clean Water Act, the State essentially treats waste-discharge requirements and NPDES as a single permitting vehicle. In April 1991, the SWRCB and other State environmental agencies were incorporated into the California EPA.

The Project does not involve any discharges to onshore surface waters and, therefore, likely does not require Section 401 certification. However, the regional boards regulate urban runoff discharges under the NPDES permit regulations. NPDES permitting requirements include runoff discharged from point (e.g., industrial outfall discharges) and non-point (e.g., stormwater runoff) sources. The regional boards implement the NPDES program by issuing construction and industrial discharge permits.

BMP are required as part of a Storm Water Pollution Prevention Plan. The California EPA defines BMP as "schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of Waters of the United States. BMP include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage" (40 CFR 122.2).

California Harbors and Navigation Code

Discharges from vessels within territorial waters are regulated by the California Harbors and Navigation Code. One of its purposes is to prevent vessel discharges from adversely affecting the marine environment. Section 151 regulates oil discharges and imposes civil penalties and liability for cleanup costs when oil is intentionally or negligently deposited in the waters of the State of California.

California Marine Invasive Species Act and California Clean Coast Act

The CSLC manages the Marine Invasive Species Program to prevent the release of nonindigenous species from commercial vessels in California waters. The program began in 1999 with the passage of California Assembly Bill 703, which codified Ballast Water Management for Control of Non-Indigenous Species under Division 36 of the Public Resources Code. The assembly bill addressed the threat of species introduced by ballast-water discharges well before Federal regulations were codified in the EPA's 2008 Vessel General Permit. This bill was repealed on January 1, 2004, and replaced with California's Marine Invasive Species Act. The Marine Invasive Species Act reauthorized and expanded the 1999 act, and all aspects of this act have become mandatory for qualified voyages within California waters. Subsequent amendments and additional legislation have expanded the scope of the Program to include research, management, and policy development related to vessel fouling and ballast water treatment technologies.

One such amendment was the California Clean Coast Act of 2005 that extended California's existing program for regulating onboard incineration and the release of grey water, sewage, sewage sludge, oily bilge water, and hazardous and other waste to cover all ocean-going ships. All ships calling on Californian ports in 2006 were required to submit information to the CSLC on their wastewater management capabilities, ports of call, and crew requirements. The submittal was required only once for each vessel.

One of the most comprehensive pieces of legislation relating to ballast-water management was the Coastal Ecosystems Protection Act of 2006. Section 4.3.5, Regulatory Setting, discusses this act and its related regulatory infrastructure.

California Ocean Plan

The Water Quality Control Plan for Ocean Waters of California (Ocean Plan) applies to point and non-point sources of waste discharge into the ocean, but it does not apply to vessel wastes or to the control of dredge-material disposal or discharge. Nonetheless, the Ocean Plan, and other regulatory vehicles that establish water-quality standards for specific discharges or situations, provides numerical and narrative guidance for the criteria used to evaluate the significance of a wider range potential impacts that may arise from the proposed Project and its alternatives. The SWRCB adopted the latest Ocean Plan amendment on April 21, 2005, which became effective on February 14, 2006 (SWRCB 2005a). The Ocean Plan specifies water-quality objectives and establishes a program of implementation to protect the State's ocean waters. The Ocean Plan also identifies specific beneficial uses, water-quality objectives, effluent limitations, and monitoring program requirements.

The Ocean Plan also regulates areas of special biological significance (ASBS), which are a subset of the recently formed State water-quality protection areas. The SWRCB designates State water-quality protection areas to protect marine species or biological communities from undesirable alterations in natural water quality. They constitute one of six categories of managed areas described in the Marine Managed Areas Improvement Act. Other categories include State marine reserves, State marine parks, State marine conservation areas, State marine cultural preservation areas, and State marine recreational management areas. The Ocean Plan designates ASBS, which presently coincide with the State water-quality protection areas. These areas are considered intrinsically valuable or have recognized value to humanity for scientific study, commercial use, recreational use, or esthetic reasons. They have the potential to benefit from protection beyond that offered by standard waste discharge requirements and other measures. The closest ASBS to the Marine Terminal is Area 24, which extends from Mugu Lagoon to Latigo Point near Malibu. It covers 24 miles (38.6 km) of coastline along the northern reaches of Santa Monica Bay and encompasses Point Dume and areas outside of the Bay toward the west.

Critical coastal areas designated by the California Coastal Commission often overlap ASBS. However, the protection goals of critical coastal areas differ and are directed at improving degraded water quality and providing extra protection from non-point-source pollution to marine areas with recognized high resource value. Consequently, critical coastal areas include “impaired water bodies” identified in the Section 303(d) list, as well as marine managed areas, wildlife refuges, waterfront parks, and beaches. There are five critical coastal areas along Santa Monica Bay’s coastline. All five are located north of the Marine Terminal starting with the closest at Ballona Creek. In order of increasing upcoast distance, the remaining critical coastal areas are at Santa Monica Canyon, Topanga Canyon Creek, Malibu Creek, and the coastal area west of Latigo Point, corresponding to ASBS Number 24.

California Toxics Rule

In 2000, the EPA promulgated numeric water-quality criteria for priority toxic pollutants and other water-quality standards provisions to be applied to inland surface waters, enclosed bays, and estuaries within the State of California. These federally promulgated criteria, together with State-adopted designated uses, created water-quality standards for California inland waters. The rule satisfies Clean Water Act requirements and fulfills the need for water-quality standards for priority toxic pollutants to protect public health and the environment. The SWRCB adopted a policy for implementing these standards that includes special provisions for certain types of discharges and factors that could affect the application of other provisions of the California Toxics Rule (SWRCB 2005b).

Local

Los Angeles Water Quality Control Plan

The LARWQCB established the Water Quality Control Plan (Basin Plan) for the coastal watersheds of Los Angeles and Ventura Counties under the requirements of the 1969 Porter-Cologne Water Quality Control Act (LARWQCB 2007a). The Basin Plan designates specific beneficial uses for onshore surface water and offshore seawater within individual areas of the basin. The Basin Plan also sets water-quality objectives, subject to approval by the EPA, intended to protect those beneficial uses. The water-quality objectives in the Basin Plan are written to apply to specific parameters (numeric objectives) and general characteristics of the water body (narrative objectives). An example of a narrative objective in the Basin Plan is the requirement that all waters must remain free of toxic substances in concentrations producing deleterious effects upon aquatic organisms. Numeric objectives specify concentrations of individual pollutants not to be exceeded in ambient waters of the basin. The water-quality objectives are achieved primarily through effluent limitations embodied in the NPDES program.

The Marine Terminal is within the EL Segundo–Los Angeles International Airport sub-watershed. This sub-watershed extends from Playa del Rey to Manhattan Beach and its designated beneficial uses include: industrial cooling water and power generation; transportation of crude and refined petroleum; contact and non-contact water recreation; commercial and sport fishing; marine habitat; wildlife habitat; preservation of rare, threatened, or endangered species; and migration of aquatic organisms.

Santa Monica Bay Restoration Plan

In December 1988, California and the EPA designated Santa Monica Bay as a nationally significant estuary and established the Santa Monica Bay National Estuary Program to recognize the need to restore and protect the Bay and its resources. The program's coalition of governments, environmentalists, scientists, industry, and the public was charged with developing and implementing a Comprehensive Conservation Management Plan for Bay protection and management. The resulting Bay Restoration Plan was approved by the Governor in December 1994 and by the EPA in 1995. The Plan's goal, to reduce pollutant loadings to the Santa Monica Bay from point and non-point sources, was designed to prevent degradation of the marine ecosystem, protect beaches, and minimize risks to human health. The Plan identified key problems and recommended actions to mitigate them. The Santa Monica Bay Restoration Project was established to facilitate and oversee the Plan's implementation. In 2003, the project formally became the Santa Monica Bay Restoration Commission, an independent non-regulatory state agency charged with implementing the nearly 250 actions identified in the Plan that target critical problems such as polluted urban runoff, degraded wetlands, and risks to public health associated with seafood consumption and swimming near storm-drain outlets.

Refinery Wastewater Discharge Permit

The LARWQCB issued an industrial waste discharge permit (NO. CA0000337, CI-1603) to the Refinery on January 13, 2007 (LARWQCB 2006). It is valid for five years and allows the Refinery to discharge to the waters of Santa Monica Bay. As described in that NPDES permit, the Refinery's treatment plant discharges an average of 7 MGD of treated wastewater, with peak flows up to 8.8 MGD during dry weather and 27 MGD during wet weather. Wastewater consists of 6.45 MGD of Refinery process water, 2.34 MGD of petroleum-hydrocarbon-contaminated shallow-well groundwater, 4 MGD from other intermittent sources, and 14 MGD of rainfall runoff that may be contaminated. As part of the discharge-permit requirements, the Refinery established a monitoring and reporting program to ensure compliance with the discharge limitations stipulated in the permit.

4.2.3 Significance Criteria

The State CEQA Guidelines require determination of a proposed Project's potential for adverse impacts to water quality and water resources, including natural water movements, drainage and flooding, and surface and groundwater quantity and quality. This section describes criteria for evaluating the significance of Project-related activities and incidents that may result in impacts to water resources. In general, the persistence, extent, and amplitude of an impact dictate its significance. Although the thresholds of significance for water-quality impacts are based on quantitative limits promulgated in existing standards, guidelines, and permits, interpretation of unacceptable changes in seawater or sediment conditions often require some judgment. For example, standards contained in a particular permit may be outdated, or a discharge may be causing previously unrecognized water-quality impacts. In other instances, perceived impacts may be a statistical artifact, for example, from a naturally occurring outlier in the distribution of ambient conditions. Thus, the significance of potential project-related changes in seawater properties must be gauged against the backdrop of naturally occurring variability within the SCB.

Based on these considerations, sediment and water-quality impacts would be considered significant if any of the following conditions were to occur as a result of the Project:

- Discharges that create pollution, contamination, or nuisances as defined in Section 13050 of the California Water Code;
- Release of toxic substances that would be deleterious to humans, fish, bird, or plant life;
- Measurable increases in contaminant concentrations compared to background concentrations within National Marine Sanctuaries, Marine Protected Areas, ASBS, Critical Coastal Areas, or Environmentally Sensitive Habitat Areas, such as coastal wetlands and kelp beds;
- Creation of a visible oil sheen on the surface of the receiving waters or marine release of fluids contaminated with oil and grease exceeding 15 ppm;

- Exposure of aquatic organisms to dissolved aromatic-hydrocarbon concentrations exceeding one part-per-billion (ppb) for periods longer than six hours (6 ppb-hour);
- Exceedance of water-quality objectives identified in the California Toxics Rule (SWRCB 2005b), the California Ocean Plan (SWRCB 2005a), or the Basin Plan (LARWQCB 2007a); and
- Exceedance of discharge limits specified in NPDES discharge permits, including the Vessel General Permit and the Refinery Wastewater Discharge Requirements (USEPA 2008, LARWQCB 2006).

4.2.4 Impact Analysis and Mitigation

This section evaluates impacts to water and sediment quality that could result from routine operations, maintenance and construction activities, and accidental spills at the Marine Terminal and by tanker vessels transiting to and from shipping lanes. Potential biological impacts resulting from Project-related declines in water and sediment quality, including those within sensitive coastal areas, are addressed further in Section 4.3, Biological Resources.

A number of factors could affect future throughput at the Refinery, including volatility in crude-oil markets, Refinery creep, and increased vessel calls at the Marine Terminal. Although some of these factors may not be directly related to the Project, it is reasonable to assume that throughput at the Marine Terminal, and the Refinery as a whole, would increase relative to current levels. This could also increase the volume of wastewater discharged through the Refinery’s outfall and potentially increase the loading of contaminants to coastal waters, thereby resulting in localized degradation of marine water and sediment quality.

Most of the influent routinely processed by the Refinery’s treatment system consists of Refinery process water, contaminated groundwater, and rainfall runoff. The only direct input to the Refinery’s wastestream by the Marine Terminal arises from relatively small and intermittent contributions of tanker-vessel ballast water. However, tankers moored at the Marine Terminal operate on their own fresh and wastewater systems and do not discharge wastewater to the Marine Terminal. Therefore, the Refinery’s throughput is unlikely to be materially affected by an increase in vessel calls over the life of the Project.

Presently, intermittent contributions from ballast-water discharges constitute only a minor, relatively clean component of the wastestream. Current wastewater throughput is well below the Refinery's wastewater treatment capacity, and any slight increase from ballast water discharged by additional vessel visits is unlikely to tax the treatment process. Ballast-water discharge processed by the Refinery requires prearrangement by the owner or agent, so most ships visiting the Marine Terminal retain their ballast water onboard. Vessels with a segregated ballast tank containing only uncontaminated water can request prior authorization to discharge the ballast water at the Marine Terminal. However, most vessels to do not discharge ballast water while at the Marine Terminal, and in the recent past only 13 percent of the vessels visiting the Terminal discharged ballast water (see Table 4.2-5). During that same period, annual discharge volumes ranged from 17.3 to 55.7 million gallons. During the upcoming lease term, a possible shift from fewer large-crude carriers from the Middle East to more small tankers arriving from South America may result in increased numbers of vessels discharging ballast water at the Marine Terminal, but a commensurate increase in discharge volumes is unlikely.

Table 4.2-5
Vessels Reporting Ballast-Water Discharges at the Marine Terminal and Discharge Volume in Millions of Gallons

Year	Vessel Calls	Vessel Discharging	Volume Discharged
2004	203	23	17.3
2005	229	35	55.7
January through June 2006	124	16	22.0

Source: Reporting forms submitted to CSLC Marine Invasive Species Program since January 1, 2004.

Presently, ballast water received through the Marine Terminal is comparatively free of chemical contaminants when it is comingled with Refinery wastewater prior to treatment. All vessels visiting the Marine Terminal since March 1994 have had segregated ballast, which decreases potential contaminant loads. Segregated ballast water is completely separated from cargo-oil and fuel-oil systems, and it is carried in a tank that is permanently allocated to ballast water or to similar cargoes that do not contain oil or other chemical contaminants. Segregating ballast water in vessels calling on the Marine Terminal conforms to the requirements in the Terminal Operations Manual, and the Marine Terminal's tanker-vessel vetting system enforces those requirements (Chevron 2008b). Even barges, which are normally not designated as segregated-ballast vessels, operate with segregated ballast while at the Marine Terminal.

Irrespective of the Project's potential influence on the quality and volume of ballast water processed by the Refinery's wastewater treatment process, it is not expected to significantly increase contaminant loading to the marine environment when discharged through the Refinery's ocean outfall. The Refinery's effluent discharge is treated to secondary standards and is regulated by an NPDES permit that ensures the objectives of the Ocean Plan and the Basin Plan are being met after initial dilution. The permit places limits on the concentration and mass emission of contaminants within effluent and stipulates an extensive receiving-water monitoring program to confirm compliance. Specification of mass-based limits on contaminant emissions, in addition to the traditional limits on effluent concentrations, ensures that treatment, rather than dilution, provides the basis for compliance. Additionally, the NPDES discharge permit undergoes an extensive review, nominally every five years, and thus is capable of incorporating new information and associated limitations on emerging contaminants throughout the Terminal's upcoming 30-year lease term. Finally, as described in Section 4.2.1, Environmental Setting, the quality and dispersion of the Refinery's wastewater discharge has markedly improved through both enhanced treatment and relocating the outfall to a deeper site farther offshore. It is reasonable to expect some additional improvement in the effluent quality over the next 30 years.

Because of the Project's limited effect on the quality and quantity of influent processed by the Refinery's wastewater treatment facility, and because discharged effluent is strictly regulated and frequently monitored, potential impacts to marine water quality from additional point-source contaminant loads from the Project are less than significant (Class III).

The quality of onshore and offshore sediments and waters could be adversely impacted by increased activities at the Marine Terminal. Potential increases in vessel calls and terminal throughput could result in more frequent incidence of small leaks and spills, increased ballast-water discharge directly to the ocean, and increased dissolution of contaminants from antifouling paints on vessel hulls.

<u>Small Leaks and Spills</u>

Small leaks and spills from the Marine Terminal are capable of introducing contaminants to SCB waters and, when located onshore, to the surficial sediments near the Marine Terminal. The projected future increase in throughput at the Marine Terminal would be expected to have a proportional increase in the frequency of small leaks and spills. However, the attendant increase in possible low-level contamination represents an adverse, but less-than-significant, impact on sediment and water quality for several reasons.

First, the volume of contaminants entering the environment during any given incident is likely to be small. This is apparent from the list of oil spills reported at the Marine Terminal since 1977, half of which were less than one gallon (see Table 4.1-5). Second, more substantial volumes of spilled material are likely to be recovered quickly or, in the case of onshore spills, more easily identified, contained, and cleaned up than offshore spills. Also, after implementation of **MM SSR-2j**, onshore spills will be largely contained within the Refinery's unsegregated drain system and processed through its wastewater treatment facility. Third, the incremental increase in spill frequency due to projected Project activities will be negligible. Spills are presently infrequent, occurring approximately twice per year, and, based on a possible 27 percent increase in vessel calls, an additional small spill would be expected to only occur once every two years by the end of the lease term. Fourth, the direct introduction of most other non-point-source contaminants, such as vessel deck wash and bilge water, is restricted at the Marine Terminal. The Terminal Operations Manual requires that each drain, scupper, or overboard discharge on a moored vessel remain closed by mechanical means. Under the 2008 EPA Vessel General Permit, vessels larger than 400 gross tons that regularly leave U.S. waters cannot discharge bilge waters within one nautical mile (1.9 km) of shore unless due to safety risk. Finally, because the coastal ocean surrounding the Marine Terminal experiences intense mixing by energetic coastal oceanographic processes, including tidal flushing and shoaling waves, small offshore leaks and spills will be rapidly dispersed and thus are unlikely to exceed significance criteria, such as creation of a visible oil sheen on the sea surface. During calm oceanographic conditions, a visible surface sheen would result in a significant water-quality impact from even a very small spill, but the sheen's spatial extent would be limited and, if not immediately contained and cleaned up, would be rapidly removed by evaporative and other dissipative processes. The same is true for small leaks and spills that occur on the open ocean during vessel transit. Thus, marine water-quality impacts from small spills are likely to be temporary and highly localized.

Onshore spills and leaks at the Marine Terminal are similarly controlled and well regulated. The Refinery's stormwater pollution prevention plan and its spill prevention control and countermeasures plan encompass the Marine Terminal (Chevron 2008a, Chevron 2004). The stormwater plan implements management controls to minimize pollutants that could be picked up and transported by stormwater runoff. For example, concrete pads with containment are located under each of the loading and unloading pump stations within the onshore portion of Marine Terminal. Although most products enter the Refinery through pipelines, any chemicals transported in drums are stored in a warehouse to prevent contamination of stormwater runoff. All roads within the facility are paved to reduce percolation of contaminated stormwater into sediments. All stormwater runoff is pumped to the Refinery's wastewater treatment facilities for treatment and discharge through the ocean outfall. Diversion tankage for high volume stormwater runoff is also available at the Refinery. These management controls ameliorate potential water-quality impacts by largely eliminating contaminants introduced by stormwater runoff. Implementation of **MM SSR-2j** and **MM SRR-2h** would further limit the potential for water-quality impacts from a small, uncontained onshore spill.

Ballast Water Discharges

Vessels that discharge or exchange ballast water directly to the marine environment are required to abide by ballast-water management practices. Ballast-water management practices are promulgated by State and Federal regulations to limit the potential introduction of invasive species. Prescribed management practices for ballast water carried into the waters of the State from areas outside the Exclusive Economic Zone have successfully minimized the uptake and release of non-indigenous species (Falkner et al. 2009). Mandatory fees for qualified voyages are submitted to California's Board of Equalization at the first port call in California. CSLC staff are afforded access to the vessels to collect samples of the ballast water intake and discharge. Each vessel maintains a vessel-specific ballast-water management plan in accordance with International Maritime Organization A868. Ballast-water logs document management activities for each tank aboard the vessel, and ballast-water report forms are submitted to both the CSLC and the National Ballast Information Clearinghouse of the USCG. The vessel master, person in charge, and crew receive training in the application of ballast water and sediment management and treatment procedures. Because ballast-water discharges from vessels calling on the Marine Terminal are limited in number and volume and, because the discharges are conducted in accordance with effective management practices, the slight increase in direct ballast-water discharges to the ocean that could result from the Project would not significantly degrade water quality.

During the upcoming lease term, a possible shift from fewer large-crude carriers from the Middle East to more small tankers arriving from South America may result in a shift in the invasive species contained within any ballast water accidently or intentionally discharged directly to the marine environment. Again, however, existing and future